

This is an Accepted Manuscript of an article published by Taylor & Francis in EUROPEAN JOURNAL OF WORK AND ORGANIZATIONAL PSYCHOLOGY on 19<sup>th</sup> October 2017, available at <http://www.tandfonline.com/> <https://doi.org/10.1080/1359432X.2017.1391792>

## **Relationships between two dimensions of employee perfectionism, postwork cognitive processing, and work day functioning**

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This research was supported by the Economic and Social Research Council (ESRC) under grant reference: RES-061-25-0232.

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## **Relationships between two dimensions of employee perfectionism, postwork cognitive processing, and work day functioning**

This daily diary study examined relations between two distinct perfectionism dimensions and work-related cognitions experienced by employees during evening leisure time. Drawing from perseverative cognitive processing theory, we hypothesized that *perfectionistic concerns* would be related to work-related worry and rumination during postwork evenings. In contrast, we hypothesized that a theoretically more adaptive perfectionist dimension (*perfectionistic strivings*) would be associated with positively valenced self-reflections about work across consecutive evenings. A sample of 148 full-time workers completed an initial survey, which included a trait perfectionism measure, reported their work-related cognitions across four consecutive evenings of a working week, rated their sleep quality immediately upon awakening on each subsequent morning, and their daily levels of emotional exhaustion and work engagement at the end of each work day. Results showed that perfectionistic concerns were indirectly negatively associated with sleep quality and work day functioning via the tendency to worry and ruminate about work. In contrast, perfectionistic strivings were indirectly positively associated with work day engagement via the propensity to experience positive thoughts about work during evening leisure time. The theoretical and practical implications of these findings are discussed.

Keywords: perfectionism; perseverative cognition; sleep; burnout; engagement

### **Relationships between two dimensions of employee perfectionism, postwork cognitive processing, and work day functioning**

The ability to recover from work demands during nonwork time is widely recognized as an important factor for maintaining employees' health and job performance. In the absence of adequate recovery experiences, the psychophysiological system can be exposed to prolonged activation, which over time increases the risk of psychological (e.g., burnout) and somatic (e.g., cardiovascular) ill-health (Brosschot, Gerin, & Thayer, 2006; Geurts & Sonnentag, 2006; McEwen, 1998; Sluiter, van der Beek, & Frings-Dresen, 1999). Within the employee recovery literature, the propensity to psychologically detach (or "switch off") from work during leisure time has attracted particular interest (e.g., Etzion, Eden, & Lapidot, 1998; Feuerhahn, Sonnentag, & Woll, 2014; Fritz, Yankelevich, Zarubin, & Barger, 2010; Rivkin, Diestel, & Schmidt, 2015; Smit, 2016; Sonnentag & Bayer, 2005; Sonnentag, Binnewies, & Mojza, 2008, 2010; Sonnentag & Fritz, 2015). A large body of research indicates that the ability to detach from work during nonwork hours (e.g., evenings and weekends) is often positively associated with employee well-being (for reviews see Sonnentag, 2012; Sonnentag & Fritz, 2015).

More recently, researchers have begun investigating the specific types of work-related cognitions experienced by employees during nonwork time. Some types of perseverative work-related thinking, such as worry and rumination, have been found to be especially detrimental to employees' well-being and recovery (e.g., Cropley, Michalianou, Pravettoni, & Millward, 2012; Flaxman, Ménard, Bond, & Kinman, 2012; Querstret & Cropley, 2012; Wang et al., 2013). In contrast, other research has shown that reflecting positively about work during nonwork time is beneficial for well-being (e.g., Binnewies, Sonnentag, & Mojza, 2009; Meier, Cho, & Dumani, 2016). Such research demonstrates that thinking about work during leisure time is not inherently problematic, and that the effects of remaining cognitively

attached to work are contingent upon the type of work-related thoughts being experienced (Sonnentag & Fritz, 2015).

Most research in this area has focused on the influence of job characteristics (e.g., time pressure and overtime hours) on detachment from work during leisure time. By contrast, the role of personality characteristics in the propensity to psychologically detach from work has received less theoretical or empirical attention. In the present study, we respond to recent calls for research examining specific types of personal characteristics that might, in theory, be influencing the way employees cognitively process work-related issues during nonwork time (e.g., Flaxman et al., 2012; Lorente Prieto, Salanova Soria, Martínez Martínez, & Schaufeli, 2008; Ragsdale, Hoover, & Wood, 2016; Sonnentag & Fritz, 2015).

Specifically, we draw from established theories of cognitive perseveration to propose and test a model that assumes a substantive role for employee *perfectionism* in the tendency to continue thinking about work during evening leisure time (see Figure 1). Using a daily survey design, we first examine a central proposition that two theoretically distinct perfectionism dimensions will be related to different modes of work-related thinking across consecutive postwork evenings. In addition, we explore the degree to which different types of work-related cognition experienced during evening leisure time mediate associations between perfectionistic characteristics and three aspects of employees' daily functioning: sleep quality, emotional exhaustion, and work engagement.

### **Previous research examining relations between personality and detachment from work during leisure time**

Although personal characteristics have not been a primary focus in detachment from work research, some studies have found that higher-order personality dimensions (such as the Big 5 or trait negative affectivity) are associated with the ability to switch off from work. For example, studies have reported cross-sectional correlations in the region of  $r = .30$  and  $.45$

between emotional stability and psychological detachment from work (e.g., Nasser, Khan, & Khawaja, 2012; Sonnentag & Fritz, 2007). Weaker relationships have been found between these broad personality traits and daily (e.g., evening) levels of detachment from work (e.g., Sonnentag & Binnewies, 2013).

A small group of longitudinal and daily diary studies has explored the role of more specific personality characteristics in detachment from work. For example, Flaxman et al. (2012) found that one aspect of trait perfectionism was positively associated with work-related worry/rumination among University academics during an Easter break. In addition, work-related worry/rumination during the Easter break was found to mediate relationships between this aspect of perfectionism and well-being during the first week back at work. In a daily diary study, Hülshager et al. (2014) found that an attentional facet of mindfulness was positively associated with the ability to detach from work across consecutive evenings. Moreover, psychological detachment from work during the evening mediated the relationship between mindful attention and sleep quality.

We believe that the extant research in this area has left some potentially important empirical questions unresolved. First, it is unclear whether different dimensions of these focal personality characteristics might relate to different modes of work-related cognition during nonwork time. For example, perfectionism measures tend to factor into two relatively distinct dimensions, only one of which is usually found to be maladaptive among working populations (Cox, Enns, & Clara, 2002; Stoeber & Damian, 2016; Stoeber & Gaudreau, 2017). Second, research has yet to establish whether such characteristics explain unique variance in the ability to cognitively switch off from work beyond other potentially influential factors, such as the tendency to continue working during leisure time, job stressors (e.g., perceived time pressure), and neuroticism/ emotional stability. Finally, previous studies of the relationship between personality and detachment have captured just one indicator of

cognitive preoccupation with work during leisure time. For example, Hülshager et al. (2014) assessed employees' general sense of detachment from work, whereas Flaxman et al. (2012) focused exclusively on work-related worry/rumination. As noted earlier, some employees who do not switch off from work during leisure time may be experiencing positive or constructive thoughts about work (e.g., Meier et al., 2016). Thus, we believe a fruitful avenue for research would be to examine whether different types of work-related cognitive processing experienced during nonwork hours are associated with distinct personality characteristics.

The present study extends prior research by exploring whether two dimensions of trait perfectionism relate to different types of work-related cognitions experienced by employees during evening leisure time. We focus on the cognitive mechanisms of employee perfectionism for two main reasons. First, as discussed in the next section, theories of cognitive processing identify perfectionism as a key vulnerability factor for perseverative worry and rumination (e.g., Berenbaum, 2010; Verkuil et al., 2011). Second, our focus on perfectionism extends recent work on the role of employees' own performance expectations as a personal demand that appears distinct from more "external" work demands (e.g., Bakker & Demerouti, 2016; Barbier, Hansez, Chmiel, & Demerouti, 2013; Lorente Prieto et al., 2008). An initial study in this area focused on the *adaptive* nature of employees' own performance expectations as a predictor of work engagement (see Barbier et al., 2013). In the present study we examine the notion that performance expectations can also be maladaptive, especially when they are underpinned (or motivated) by a fear of failing or making mistakes (Frost, Marten, Lahart, & Rosenblate, 1990; Stoeber & Otto, 2006).

With these issues in mind, we propose and test a dual path model (see Figure 1), in which one perfectionism dimension (i.e., *perfectionistic concerns*) is predicted to relate to dysfunctional levels of work-related worry/rumination measured across four consecutive

postwork evenings. In contrast, our model posits that a theoretically more adaptive dimension of perfectionism (i.e., *perfectionistic strivings*) would be related to positive thinking about work during evening leisure time. As indicated in Figure 1, these distinct personality and cognitive processing configurations are, in turn, expected to show a divergent pattern of associations with employees' sleep quality and daily work functioning.

### **Perfectionism and cognitive processing: Theoretical principles**

Our model's hypothesized paths between the two perfectionism dimensions and work-related cognitive processing are derived from the initiation-termination (IT) model of worry (Berenbaum, 2010). The IT model offers a synthesizing theoretical framework that integrates two other theories of cognitive processing: the metacognitive theory of worry and rumination (e.g., Wells, 2004), and the mood-as-input theory of cognitive and behavioral perseveration (e.g., Davey, 2006). This two-phase model identifies an interrelated set of personality characteristics and cognitive-affective processes that function to: (a) trigger episodes of worry and/or rumination (the *initiation* phase); and (b) increase the "momentum" of this type of cognitive processing, making it unhelpfully perseverative, recurrent, and difficult to terminate (the *termination* phase).

### ***Perfectionistic concerns and perseverative worry/rumination***

Perfectionistic concerns represent the most maladaptive dimension of perfectionism. This dimension is characterized by an excessive concern about making mistakes, fear of failure, self-criticism, and doubts about the quality of one's actions (resulting in the tendency to repeatedly check tasks for mistakes; Blankstein, Dunkley, & Wilson, 2008; Frost & DiBartolo, 2002; Frost et al., 1990; Hewitt & Flett, 2002). Perfectionistic concerns have been associated with various markers of poor mental health (e.g., negative affect and heightened stress reactivity) and behavioral ineffectiveness (e.g., avoidant coping; Chang, Watkins, & Banks, 2004; Cox et al., 2002; Dunkley, Mandel, & Ma, 2014; Dunkley, Zuroff, &

Blankstein, 2003; Hill & Curran, 2016; Stoeber & Rennert, 2008). Although most research focuses on perfectionism among college students, a growing number of studies have found negative associations between perfectionistic concerns and employees' mental health (see Stoeber & Damian, 2016 for a recent review).

The IT model suggests that individuals high in perfectionistic concerns possess a particular set of characteristics that facilitate unhelpful forms of thinking, such as perseverative worry and rumination. First, the model posits that episodes of worry/rumination are initiated in response to a perceived threat. For people high in perfectionistic concerns, a frequent and primary threat is failing or making mistakes. These individuals tend to endorse conditional beliefs that function to ensure the prospect of failing carries an unusually significant and personal cost; for instance, believing that failing at any single task means that one is a "complete" failure or a failure "as a person" (Frost et al., 1990). According to the IT model, such elevated cost estimates serve to increase the magnitude of perceived threats (Berenbaum 2010). Thus, even if an unwanted outcome is believed to be relatively unlikely to occur (i.e., it has a low probability estimate), it may still be appraised as a significant threat if the perceived personal costs of its occurrence are high.

The characteristics associated with perfectionistic concerns also play an influential role in the termination phase of the IT model, which focuses on why bouts of worry/rumination can, for some individuals, become highly perseverative and difficult to stop. For individuals displaying perfectionistic concerns, threat appraisals tend to activate metacognitive beliefs about the *benefits* of worrying and ruminating, typically the belief that this type of thinking helps one to prepare thoroughly for future events, reduce the risk of failing, and/or (in the case of rumination) avoid repeating past mistakes (Macedo, Marques, & Pereira, 2014). As a result, these individuals may deploy stringent (and often implicit) decision rules about the need to think through all possible scenarios linked to the focal threat



or problem (Davey, Startup, MacDonald, Jenkins, & Patterson, 2005). The implicit goals of such a task are usually to reduce the perceived threat, to obtain a satisfactory solution, and/ or to feel less anxious about some future undesirable outcome. Unfortunately, individuals exhibiting perfectionistic concerns are prone to use concurrent (and often negative) mood as a source of information to indicate whether the goals of the cognitive processing task have been achieved (Davey et al., 2005). In this way, negative affect is utilized as a “sign” that the goals of the cognitive task have not yet been fully met (e.g., by signaling that the desired state of satisfaction has not yet been obtained), thereby delaying any sense of closure, and fueling further (and sometimes prolonged) bouts of cognitive perseveration (Berenbaum, 2010; Meeten, & Davey, 2011).

To summarize, the IT model provides a theoretical account to explain why perfectionistic concerns are likely to be associated with frequent and prolonged bouts of worry and rumination. On the basis of these assumptions, we predict that perfectionistic concerns will be related to work-related worry/rumination aggregated across consecutive evenings of the working week, above and beyond the influence of a second dimension of perfectionism (i.e., perfectionistic strivings), trait emotional stability, job stressors (e.g., time pressure), and hours of overtime worked during postwork evenings. Hence,

*Hypothesis 1:* Perfectionistic concerns will be positively and uniquely related to work-related worry/rumination across consecutive post-work evenings.

As illustrated in Figure 1, we then posit that worry/rumination about work during the evening will have a detrimental impact on employees’ work day functioning. This mode of cognitive processing tends to prolong stress-related psychophysiological activation, affects sleep, and hence inhibits recovery (Geurts & Sonnentag, 2006; McEwen, 1998; Verkuil et al., 2011). Accordingly, we anticipate that a heightened tendency to worry and ruminate about work will mediate relationships between perfectionistic concerns and three common

indicators of daily functioning: sleep quality, emotional exhaustion, and daily work engagement.

*Hypothesis 2:* There will be a negative indirect (i.e., mediated) relationship between perfectionistic concerns and both sleep quality (*Hypothesis 2a*) and work engagement (*Hypothesis 2b*) operating through work-related worry/rumination during post-work evenings; and a positive indirect relationship between perfectionistic concerns and emotional exhaustion (*Hypothesis 2c*) also via evening worry/rumination about work.

### ***Perfectionistic strivings and positive thinking about work***

As noted earlier, researchers have identified a second perfectionism dimension (perfectionistic strivings), which is typically seen as more adaptive, or at least less harmful to people's mental health and behavioral functioning (Stoeber & Gaudreau, 2017; Stoeber & Otto, 2006). This dimension is primarily characterized by the pursuit of very high, and typically self-imposed, performance standards and expectations (Blankstein et al., 2008; Cox et al., 2002; Frost et al., 1990).

According to IT model assumptions, perfectionistic strivings should not be as strongly associated with the cognitive-affective characteristics that facilitate perseverative worry/rumination. First, individuals high in perfectionistic strivings tend to show sensitivity to approach-oriented (or "reward-focused") forms of motivation (Chang et al., 2007; Slade & Owens, 1998); this motivational pattern contrasts with the avoidance-based reinforcement sensitivity exhibited by individuals high in perfectionistic concerns, whose primary motivation is avoidance of failure (Chang et al., 2007; Santanello & Gardner, 2007). As a result, individuals high in perfectionistic strivings would be less likely to experience the elevated cost estimates and threat appraisals that initiate frequent episodes of worry/rumination. Second, the perfectionistic strivings dimension is often only weakly related to negative affect (Stoeber & Otto, 2006). This has important implications for the

ability to terminate bouts of worry/rumination, should they occur. Specifically, those high in perfectionistic strivings would be less inclined to use concurrent negative mood as an implicit “signal” that a cognitive processing task has failed to achieve its goals (Davey et al., 2005). This reduces the likelihood that cognitive processing tasks (e.g., thinking through work-related difficulties) will become unhelpfully perseverative.

As illustrated in Figure 1, we predict that perfectionistic strivings will instead be associated with positive work-related thoughts during evening leisure time. This prediction is consistent with the notion that perfectionistic strivings are partly underpinned by a reward responsive (i.e., approach-oriented) motivation (Chang et al., 2007; Stoeber & Corr, 2015; Stoeber & Rennert, 2008). This motivational pattern may manifest in thought content that is shaped more by cognitive representations of potential “rewards” than by perceptions of threat. Accordingly, we theorized that employees high in perfectionistic strivings would experience, and be attentive to, positively valenced self-reflective cognitions that help to confirm that performance expectations are being met. This type of thinking can be viewed as a specific (i.e., work-related) example of the attainment-focused and self-affirmative mode of cognitive processing (such as “basking”) that has been discussed in the social cognition literature (see Martin & Tesser, 1996). If these theoretical assumptions are correct, we expect employees high in perfectionistic strivings to show (a) fewer signs of perseverative worrying and ruminating about work during leisure time, and (b) a tendency to experience positive reflections about their work performance. Hence,

*Hypothesis 3:* Perfectionistic strivings will be positively related to positive work-related thinking (e.g., positive reflection on one’s work performance) across consecutive evenings.

Reflecting positively about oneself in relation to work is a mode of cognitive processing likely to have different consequences when compared to worry/rumination

(Martin & Tesser, 1996). Thinking positively about work during evening leisure time should not activate threat-based psychobiological systems (McEwen, 1998) or further deplete emotional resources (Binnewies et al., 2009). Instead, a propensity for positively valenced work-related cognitive processing may function as a potent personal resource (see Grebner, Elfering & Semmer, 2010), and might help to explain the positive associations found in previous studies between perfectionistic strivings and employee well-being. Hence,

*Hypothesis 4:* There will be a positive indirect (i.e., mediated) relationship between perfectionistic strivings and sleep quality (*Hypothesis 4a*) and daily work engagement (*Hypothesis 4b*), and a negative indirect relationship between perfectionistic strivings and emotional exhaustion (*Hypothesis 4c*), via positive thinking about work during post-work evenings.

## Method

### Participants

Participants were government agency employees in the United Kingdom. All participants worked a traditional regular schedule (e.g., 9am to 5pm). Completed surveys were returned by 160 employees. We removed those participants who had failed to respond to any of the perfectionism dimensions or to any of the outcome variables at any time point. This resulted in a final analysis sample of 148 participants, providing a total of 589 observations on day-level variables measured across four consecutive days. These observations were 97% complete, with just a handful of missing responses to the sleep quality and worry/rumination variables (specifically 16 missing observations spread among 11 different respondents). Participants' average age was 41 years ( $SD = 9.6$ , range = 20 to 60 years), 72% were female, and median tenure with current organization was 7 years ( $IQR = 5$ , range = 1 to 34 years). Participants worked an average of 39 hours in a typical working week.

### Procedure

An advertisement for the research was distributed via the organization's internal staff email on two separate occasions. Employees were invited to contact the research team if interested in participating or to request further information. Due to the nature of the study, and security restrictions surrounding some of the organization's IT systems, data were collected via paper and pencil survey booklets. An initial group of 241 employees expressed interest and received a pack of four survey booklets in the post, with instructions on when to complete each survey, and a pre-paid envelope for returning completed surveys. The survey booklets were labeled "Initial Survey", "Evening Surveys", "Morning Surveys", and "After Work Surveys". The surveys could be completed in any relatively normal working week of participants' choosing, within one month of receipt. The initial survey included measures of perfectionism, trait emotional stability, demographic information, and job characteristics. Participants were instructed to complete the initial survey just before beginning the daily survey booklets. The full measurement schedule is summarized in Table 1.

The evening surveys included measures of the hypothesized work-related cognitive processing mediators. These surveys were completed on four occasions, Monday to Thursday evenings, just before going to bed. To capture day-level outcomes, participants completed a morning sleep quality survey on four occasions (Tuesday to Friday morning, immediately upon awakening); and then an after work survey on three occasions (Tuesday to Thursday, around 5pm or 6pm) to capture daily levels of emotional exhaustion and work engagement. These measurements provided four time points for the previous evening and morning measures, and three time points for the after work measures. The study ended with the Friday morning survey, since Friday afternoon is considered part of the psychological transition period between the working week and weekend (Areni, 2008).

Survey instructions included a suggestion to keep the morning and evening survey booklets near to one's bed, so they could be completed just before going to sleep (rating

evening experiences) and upon awakening (rating sleep quality). Participants were instructed to take the after work survey booklet into work, and to rate work day levels of exhaustion and engagement as soon as work ended. Participants were asked to record date and time of completion at the beginning of each daily survey. Instructions stressed the importance to the study of leaving a survey blank if participants had forgotten to complete it at the correct time.

### **Initial survey measures**

#### ***Perfectionism***

Frost et al.'s Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) was used to measure perfectionistic concerns and strivings. Consistent with previous research, we measured perfectionistic concerns with a combination of items from the FMPS concern over mistakes and doubts about actions subscales (e.g., Cox et al., 2002; Dunkley et al., 2003). We used the 5-item short form concern over mistakes subscale validated by Cox et al. (2002; e.g., "The fewer mistakes I make, the more people will like me"); and the 4-item doubts about actions subscale (e.g., "Even when I do something very carefully, I often feel that it is not quite right"). Perfectionistic strivings were measured with the 5-item short form FMPS personal standards subscale validated by Cox et al. (2002; e.g., "I expect higher performance in my daily tasks than most people"). Items were scored on a six-point response scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

### **Evening survey measures**

#### ***Work-related worry/rumination***

We measured work-related worry/rumination across four consecutive evenings, using three items adapted for the day level from the perseverative cognition scale developed by Flaxman et al. (2012): "I worried about things I need to do at work"; "I worried about how I would deal with a work task or issue"; and, "My thoughts kept returning to a stressful situation at work". Participants were asked to rate the extent to which they had experienced such

thoughts during each evening, since leaving work. The response scale ranged from 1 (*not at all*) to 5 (*a great deal*).

### ***Positive thinking about work***

We developed three items to capture positive thoughts about work during each evening: “I thought positively about my work performance”, “I had constructive thoughts about a work project”, and “I reflected on things that have gone well for me in my job”. These positive work-related thinking items were randomly mixed with the worry and rumination items described above, and administered with the same instructions and response format.

### **Morning survey measure**

#### ***Sleep quality***

Upon awakening, participants rated their sleep quality using four items from the Karolinska Sleep Diary (Åkerstedt, Hume, Minors, & Waterhouse, 1994; Keklund & Åkerstedt, 1997). As previously shown by Keklund and Åkerstedt (1997), these four items combine to create a sleep quality index that captures both initiation and maintenance of sleep. Items were “How was your sleep last night?” (rated 1 *very poor* through to 5 *very good*); “How calm was your sleep last night?” (1 *very restless* to 5 *very calm*); “How easy did you find it to fall asleep?” (1 *very difficult* to 5 *very easy*); and “Did you wake up prematurely?” (rated on a three-point scale: *yes, I woke up much too early*; *yes I woke up a bit too early*; and *no, I did not wake prematurely*).

### **After work survey measures**

#### ***Emotional exhaustion***

Work-related exhaustion was measured at the end of each work day (i.e., around 5pm or 6pm), with four items adapted from the emotional exhaustion subscale of the Maslach Burnout Inventory (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996). The validity of adapting these MBI items for measuring state-level exhaustion has been demonstrated in

previous research (e.g., Derks, van Mierlo, & Schmitz, 2014; Flaxman et al., 2012; Schmidt, Klusmann, Lüdtkke, Möller, & Kunter, 2017). Items were modified to assess work-induced exhaustion for that particular work day (e.g., “I felt burned out from my work”). A fifth item (“I felt frustrated by my job”) was excluded due to its detrimental impact on the fit of our measurement model (see *Results* section). The response options ranged from 1 (*strongly disagree*) to 6 (*strongly agree*).

### ***Work engagement***

Day-level engagement was measured with items adapted from the Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2003). The following five items demonstrated strong psychometric properties across three consecutive work days, and were statistically distinct from the work-related exhaustion measure: “I felt strong and vigorous while working”; “I felt happy because I was working intensely”; “I felt enthusiastic about my work”; “I felt inspired by my job”; and “I felt bursting with energy in my work”. The validity of using a subset of UWES items, adapted to the day level, has been demonstrated in previous daily diary studies (e.g., Bakker & Xanthopoulou, 2009; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). The engagement items were mixed with the emotional exhaustion items, and followed the same instructions and response format.

### **Control variables**

To examine the relative influence of perfectionism over and above other work and personal characteristics, we controlled for work demands (general perceptions of time pressure, and amount of overtime worked each evening), job control, and trait emotional stability. We deemed it important to control for both work demands and job control, given the compelling body of evidence indicating that these work design variables are reliably associated with burnout and engagement (e.g., Bakker & Demerouti, 2016). We controlled for emotional stability as researchers have emphasized the importance of assessing the unique influence of



perfectionism on cognitive and affective outcomes beyond such “higher-level” personality factors (e.g., Clark, Lelchook, & Taylor, 2010). We measured work demands in the initial survey with six time pressure items adapted from the Job Content Questionnaire (JCQ; Karasek et al., 1998) and Haynes, Wall, Bolden, Stride, and Rick’s (1999) work characteristics scales. An example item was: *In your job, to what extent do you...* “Work under a great deal of time pressure?” Job control was measured with Haynes et al.’s (1999) six item work autonomy and control scale; e.g., *In your job, to what extent do you...* “Plan your own work?”. The demands and control items were rated on a five-point response scale from 1 (*not at all*) to 5 (*a great deal*).

Trait emotional stability was measured using the single-item bipolar scale developed by Woods and Hampson (2005). This item’s response scale has personality descriptors as anchor statements at each end of a continuum: at the lower scored end “Someone who is sensitive and excitable, and can be tense”; and at the higher scored end “Someone who is relaxed, unemotional, rarely gets irritated and seldom feels blue”. Participants were asked to rate how each description “sounds like you”. We coded the continuum as a nine-point rating scale, from -4 to 4, with zero as the central point representing both descriptors “sounding equally like you”. A higher score indicated a higher level of emotional stability.

We measured overtime work in each evening survey, asking participants to state any time spent (in hours and minutes) during that evening on work-related activities outside of normal working hours. Person mean and daily person-mean-centered scores were computed in units of hours. Finally, we controlled for age (years), and gender (coded 1 *male*, 0 *female*).

### **Analytic strategy**

Our analysis comprised two main stages. First, we assessed the validity of our measurement model, designed to capture the two perfectionism dimensions, distinct modes of work-related cognitive processing, work engagement, exhaustion, sleep quality, and the work

characteristics employed as control variables. The second stage extended the validated measurement model to a multilevel structural equation model to test the hypothesized direct and indirect effects (see Preacher, Zyphur, & Zhang, 2010).

### ***Measurement model validation***

We employed multilevel confirmatory factor analysis (MCFA) to validate the proposed five-factor measurement model for the constructs assessed on consecutive days (distinct factors for work-related worry/rumination, positive thinking about work, sleep quality, emotional exhaustion, and work engagement). This approach allowed us to (a) control for non-independence of multiple measurements from the same participants, and (b) examine the possibility of construct measurement operating differently at the day and person levels. Following the order suggested by Hox (2002), we first tested the adequacy of the lower-level (i.e., our day-level) structure alone, and then applied MCFA to test whether the hypothesized structure also existed at the higher (i.e., person) level, or whether plausible competing models offered an improvement in fit.

Having established the best multilevel measurement model for the daily survey measures, we tested temporal measurement invariance to ensure that each measure worked (and was understood) in the same way on each occasion (van de Schoot, Lugtig, & Hox, 2012). Measurement invariance testing was performed by transposing the data to the person-level, and, for each separate factor, assessing fit and comparing successive models in which: item-factor loadings, intercepts, and item variances were free to differ across time (i.e., *configural invariance*); item-factor loadings were fixed equal across time (i.e., *metric invariance*); and item-factor loadings and intercepts were fixed equal across time (i.e., *strong invariance*).

We utilized conventional CFA to test the proposed four factor structure of the person-level measures (i.e., those collected once in the initial survey), hypothesizing perfectionistic

concerns, perfectionistic strivings, work demands, and job control as distinct factors. In line with previous research, we assessed perfectionistic concerns as a second-order manifestation of the FMPS concern over mistakes and doubts about actions subscales.

### *Hypothesis testing*

We constructed a multilevel structural equation model (MSEM) to test our hypotheses. Ideally, we would have combined and extended the measurement models validated for the day-level and person-level measures; however, the person-level sample size relative to number of model parameters to be estimated precluded using latent variables for every construct. Thus, using the item-factor groupings validated by CFA and MCFA, we computed composite scores for each construct by averaging across the respective items. We used these variables, along with our control variables, to construct a MSEM<sup>1</sup> of the hypothesized 2-1-1 type mediation model (see Figure 1).

Given our focus on perfectionist personality dimensions, we were primarily interested in effects at the person level. Thus, we added the following paths: (1) from the two perfectionism dimensions to the person-level parts of each hypothesized mediating variable (i.e., work-related worry/rumination and positive thinking about work); (2) from these cognitive processing variables to the person-level parts of our model outcomes (i.e., sleep quality, work engagement, and emotional exhaustion); and (3) direct paths between the perfectionism dimensions and each outcome. Outcomes and mediators were also regressed upon all control variables. We calculated estimates of person-level indirect effects of perfectionistic concerns and strivings on each outcome via the two proposed cognitive processing mediators. Indirect effects were tested by calculating confidence intervals via Monte Carlo simulation (see Bauer, Preacher, & Gil, 2006; Preacher & Selig, 2012; Preacher,

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<sup>1</sup> MSEM provides the most reliable estimate of each participant's average across time for the constructs collected at the day-level. In MSEM, the higher level (i.e., person-level) parts of these constructs are represented as latent variables estimated using shared within-participant variance, as opposed to using person mean scores (see Preacher et al., 2010).

et al., 2010; Selig & Preacher, 2008).

Although we made no specific prediction about change over time, as a supplementary analysis, we added paths at the day level from the (person-mean-centered) mediators to the outcomes, and the effect of time (i.e., day of study) and person-mean-centered evening hours worked as predictors of each mediator and outcome. These day-level variables were person-mean-centered to remove person-level variability; so that they are measuring just the effect of the predictor on the day, as opposed to an (uninterpretable) mixture of daily effect and typical person effect (Curran & Bauer, 2011). We then examined whether the effect of time on each variable varied between participants.

Models were estimated using *Mplus* software v7.4, and fitted by Full Information Maximum Likelihood estimation (FIML), using missing data theory under the assumption of missing completely at random (MCAR; Muthén & Muthén, 1998-2012). Given that we had systematic missing data arising from not measuring day-level exhaustion and engagement on Friday afternoon, as a robustness check we reran the analyses for days 1 to 3 only and compared the results. Finally, due to a slight positive skew on the work-related worry/rumination and emotional exhaustion variables, as a further robustness check we reran our analysis using a Robust Maximum Likelihood estimator (MLR).

## Results

### Measurement model

#### *Day-level measures*

When assessing the (person-mean-centered) day-level items using a single level CFA, the proposed five factor structure (with separate factors for work-related worry/rumination, positive thinking about work, emotional exhaustion, sleep quality, work engagement) demonstrated a satisfactory fit:  $\chi^2(142) = 471.82$ , CFI = .934, RMSEA = .060, SRMR = .056.

This solution outperformed plausible alternative models, notably those combining work-

related worry/rumination with either positive thinking about work or emotional exhaustion.

As expected with a daily survey design, the ICC(1) statistics for day-level items were high, justifying a multilevel approach ( $.294 < \text{ICC}(1) < .629$ ). Retaining the five factor model at the day-level, we used MCFA to test a matching model at the person level. This model exhibited satisfactory fit:  $\chi^2(284) = 529.73$ , CFI = .938, RMSEA = .037, SRMR Within = .053, SRMR Between = .085. The five person-level factors appeared distinct, in that shared variation between them did not exceed the AVE score for the sets of items loading on any factor. Alternative person-level factor structures, which combined correlated factors, diminished model fit.

Four of the five constructs measured at the day level demonstrated strong measurement invariance over time, and model fit was not significantly compromised by fixing item-factor loadings or intercepts. The positive thinking about work factor failed to achieve strong invariance, but demonstrated metric invariance; however, considered in isolation, the strong invariance model offered a satisfactory fit. The ICC(1) statistics for mean (composite) scale scores calculated for each factor for each day were again high: work-related worry/rumination .575; positive thinking about work .477; emotional exhaustion .690; sleep quality .637; work engagement .385. Using Cronbach's alpha in a multilevel context, as described by Geldhof, Preacher, and Zyphur (2014), we calculated within- and between-person internal consistency reliability for each scale. The estimates suggested adequate consistency for these brief scales at both day- and person-levels: work-related worry/rumination day-level alpha = .74, person-level alpha = .94; positive thinking about work .69, .88; emotional exhaustion .66, .93; sleep quality .71, .85; and, work engagement .74, .95.

### ***Person-level measures***

For person-level only measures (i.e., perfectionistic concerns, perfectionistic strivings, work demands, and job control), a four factor model, including a second-order perfectionistic concerns factor, offered an adequate fit to the data:  $\chi^2(244) = 322.76$ , CFI = .944, RMSEA = .046, SRMR = .070. Discriminant validity was evident, with intra-factor correlations all falling below  $\rho = .303$ . Two simpler alternative measurement models--a first-order only four factor model in which the concern over mistakes and doubts about actions items loaded on to one factor, and a first-order three factor model with all perfectionism items loading on to one factor--offered a significantly weaker fit:  $\Delta\chi^2(2) = 27.01$ ,  $p < .001$  and  $\Delta\chi^2(5) = 213.17$ ,  $p < .001$ .

A first-order only five factor model, in which distinct concern over mistakes, doubts about actions, and perfectionistic strivings factors were estimated, did not yield a better fit than our proposed second-order model:  $\chi^2(242) = 320.50$ , CFI = .944, RMSEA = .046, SRMR = .069,  $\Delta\chi^2(2) = 2.26$ ,  $p = .97$ . Given the strong correlation between the concern over mistakes and doubts about actions factors in this model ( $\rho = .843$ ), the model including the single second-order perfectionistic concerns factor was considered the preferable solution. The person-level measures exhibited high internal consistency: perfectionistic concerns,  $\alpha = .82$ ; perfectionistic strivings,  $\alpha = .77$ ; work demands,  $\alpha = .78$ ; job control,  $\alpha = .87$ .

### **Hypothesis testing**

Our hypothesized model (see Figure 1), incorporating paths from perfectionistic concerns and perfectionistic strivings to the person-level parts of the proposed work-related cognitive processing mediators, and from these mediators to sleep quality, work engagement, and emotional exhaustion, demonstrated a satisfactory fit to the data:  $\chi^2(10) = 11.82$ ,  $p = .297$ , CFI = .995, RMSEA = .018, SRMR Within = .016, SRMR Between = .022. Table 2 displays the means, standard deviations, and bivariate correlations. Table 3 summarizes the model's direct and indirect path coefficients.

In support of Hypothesis 1, we found a significant positive relationship between perfectionistic concerns and work-related worry/rumination,  $B = 0.23$ , 95% CI [0.09, 0.37],  $p = .002$ , with perfectionistic concerns explaining 6% unique between-person variance in work-related worry/rumination. In support of Hypothesis 3, there was a significant positive relationship between perfectionistic strivings and positive thinking about work,  $B = 0.13$ , 95% CI [0.01, 0.26],  $p = .039$ , with perfectionistic strivings explaining 5% unique between-person variance in positive thinking about work. Adding the alternative pair of predictors to mediator paths (i.e., from perfectionistic concerns to positive thinking about work, and from perfectionistic strivings to work-related worry/rumination) did not significantly improve model fit:  $\chi^2(8) = 11.71$ ,  $\Delta\chi^2(2) = 0.11$ ,  $p = .165$ ; and neither of these alternate paths were statistically significant.

As shown in Table 3, evening work-related worry/rumination was significantly positively associated with emotional exhaustion, and significantly negatively related to work engagement and sleep quality, uniquely explaining between 7% and 22% of person-level variance in these model outcomes. In support of Hypotheses 2a, 2b, and 2c, there were indirect relationships between perfectionistic concerns and each outcome via work-related worry/rumination: indirect effect on emotional exhaustion = 0.15, 95% CI [0.05, 0.25],  $p = .003$ ; on work engagement = -0.10, 95% CI [-0.18, -0.04],  $p = .005$ ; and on sleep quality = -0.07, 95% CI [-0.13, -0.02],  $p = .013$ . Adding direct paths between perfectionistic concerns and each outcome did not improve model fit:  $\chi^2(7) = 6.91$ ,  $\Delta\chi^2(3) = 4.91$ ,  $p = .178$ .

Positive work-related thinking had a significant positive relationship with work engagement, uniquely explaining 47% of person-level variance in this outcome. In support of Hypothesis 4b, positive work-related thinking transmitted a significant positive indirect relationship between perfectionistic strivings and work engagement: indirect effect = 0.12, 95% CI [0.01, 0.25],  $p = .042$ . Contrary to Hypotheses 4a and 4c, there was no evidence of an

indirect relationship between perfectionistic strivings and sleep quality or emotional exhaustion via positive thinking about work. Adding direct paths from perfectionistic strivings to each outcome did not improve model fit:  $\chi^2(7) = 9.96$ ,  $\Delta\chi^2(3) = 1.87$ ,  $p = .60$ .

The day-level results are reported in the lower portion of Table 3. There was a significant negative relationship between (person-mean-centered) work-related worry/rumination and sleep quality:  $B = -0.24$ , 95% CI  $[-0.33, -0.16]$ ,  $p < .001$ . Emotional exhaustion was the only daily variable to show significant linear change over time, decreasing from Tuesday to Thursday. The fit of the model was not improved by allowing the effect of change over time in mediators and outcomes to vary between participants, and none of the estimated slope variance coefficients was statistically significant.

Finally, our robustness checks performed by repeating the MSEM analyses using the data from time points 1 to 3 only, and when using MLR estimation, produced an identical pattern of results. Excluding the control variables (of which age, work demands, job control and evening hours worked had significant associations with one or more outcomes) did not remove any of the significant relationships between the perfectionism dimensions, mediators, or outcomes.

### Discussion

The aim of this study was to test a model in which two perfectionism dimensions were related to different modes of work-related cognitive processing during evening leisure time; different forms of work-related cognitive processing were in turn predicted to have different consequences for employees' work day functioning. In support of our first hypothesis, our findings provide evidence that perfectionistic concerns are associated with a tendency to worry and ruminate about work during postwork evenings. In support of Hypotheses 2a, b and c, this type of perseverative work-related cognitive processing was found to have an adverse influence on employees' sleep quality, exhaustion and work engagement. It is



noteworthy that all three specific indirect effects of perfectionistic concerns on the work day outcomes via work-related worry/rumination were statistically significant, despite controlling for a set of potentially confounding variables: emotional stability, perfectionistic strivings, work characteristics (i.e., time pressure and job control), and time spent on work activities during evening leisure time.

In support of Hypothesis 3, we also found evidence that a second perfectionism dimension, perfectionistic strivings, was associated with a different mode of work-related cognitive processing. Specifically, perfectionistic strivings were not uniquely related to evening levels of work-related worry/rumination, and instead predicted evening levels of positive thinking about work. For this dimension, only one of the three hypothesized indirect effects on work day functioning was supported (i.e., Hypothesis 4b), with positive work-related thinking across consecutive evenings mediating a positive relationship between perfectionistic strivings and work engagement.

### **Theoretical implications**

These results have potential implications for the study of individual differences in detachment from work research, for the application of perseverative cognitive processing theories to working populations, and for the growing interest in the effects of perfectionism and personal performance expectations among working age adults. First, there have been recent calls for research designed to understand the role played by specific personality characteristics in employees' leisure time experiences (e.g., Flaxman et al., 2012; Ragsdale et al., 2016; Sonnentag & Fritz, 2015). Such research should prove useful for enhancing our understanding of (a) the types of employees who suffer most due to an inability to cognitively switch off from work, (b) the types of employees who benefit from thinking about work during nonwork time, and (c) the intrapersonal cognitive-affective processes that might help to explain such differences. The present study contributes to this area of research by

demonstrating that distinct dimensions of perfectionism were uniquely associated with different modes of work-related cognitive processing during evening hours.

Second, this study may help to advance understanding of (impaired) detachment from work by testing hypotheses derived from the IT model of worry, which identifies personality and cognitive-affective processes likely to influence work-related thinking during off-job time. The finding that perfectionistic concerns explained unique variance in worry and rumination (i.e., Hypothesis 1) is congruent with IT model predictions. From an IT perspective, individuals with a vulnerability for perfectionistic concerns are likely to deploy a combination of heightened threat appraisals and mood-as-input processes, which function together to initiate and then fuel bouts of unhelpfully perseverative thinking (see Berenbaum, 2010). Given the growing interest in *work-related* worry and rumination among recovery researchers, the IT model--and the cognitive processing theories it incorporates--may prove informative for understanding how, and for whom, such perseverative thinking unfolds. As we have seen, IT principles help to explain why dysfunctional processing of work issues can keep recurring for some employees during nonwork time, when work stressors are no longer physically present.

Third, our study contributes to the literature on employee perfectionism, most notably by offering insight into the distinct (work-related) cognitive processes through which the two perfectionism dimensions seem to operate. Our findings may help to inform debate about whether perfectionistic strivings should be considered “adaptive”. Some scholars have been unconvinced that perfectionism dimensions should be labeled as adaptive or positive (e.g., Flett & Hewitt, 2006). In contrast, Stoeber and Otto (2006) concluded that evidence in favor of perfectionistic strivings being a healthy form of perfectionism “far outweighs” the evidence against it (p. 296; see also Hill & Curran, 2016). The degree to which the setting and pursuit of very high performance standards is adaptive may ultimately depend on the

population being studied. Among clinical populations, having stringent performance expectations might itself serve a range of maladaptive functions and thus help to maintain presenting problems (cf., Egan, Wade, & Shafran, 2011). Among general working populations, perfectionistic strivings (or closely related constructs) have been empirically linked to adaptive coping, lower burnout and fatigue, and higher work engagement (e.g., Childs & Stoeber, 2010; Stoeber & Rennert, 2008; for an exception see Sherry, Hewitt, Sherry, Flett, & Graham, 2010).

Given this ongoing debate, we followed Stoeber et al.'s recommendation by simultaneously assessing the effects of the perfectionistic strivings and concerns dimensions (Stoeber & Gaudreau, 2017; Stoeber & Otto 2006). Under these analytic conditions, we observed an indirect relationship between perfectionistic strivings, positive thinking about work and daily levels of work engagement. On the basis of these (and previous) findings, it seems reasonable to conclude that striving for perfectionistic standards, or having very high performance expectations for oneself, is not *in itself* detrimental to employees' well-being, and may even heighten a propensity for work day engagement (see also Barbier et al., 2013; Childs & Stoeber, 2010; Stoeber & Gaudreau, 2017). Thus, it is important to draw a distinction between the healthy pursuit of high (self-oriented) performance expectations, and perfectionistic tendencies that are motivated by fear of failure and concern about making mistakes (as seen among those high in perfectionistic concerns).

Finally, we hope that the results of this study will help inform recent theorizing around the role of employees' own performance expectations in models of job burnout and work engagement. The significant indirect path between perfectionistic strivings and work engagement in our model aligns with Barbier et al.'s (2013) finding that relatively stable and self-imposed performance expectations were positively associated with job engagement. The present study extends this earlier research by showing how performance expectations can be

maladaptive when they are motivated by an underlying fear of failing or making mistakes. Hence, it may prove useful for future explorations of these constructs to include a multidimensional measure of trait perfectionism, raising the possibility of capturing both adaptive and maladaptive functions of employees' intrapersonal performance expectations.

### **Practical implications**

Cognitive-behavioral therapy (CBT) interventions have been shown to address some of the problematic aspects of the perfectionist personality repertoire (e.g., Pleva & Wade, 2007). These interventions can be brief and cost-effective (e.g., guided self-help), making them suitable for workplace delivery. It may also help to educate managers about the common characteristics of perfectionism. For example, managers might be trained to refrain from “punishing” relatively minor mistakes, to ensure they do not reinforce unhelpfully perfectionistic expectations and behaviors in their direct reports. Worksite interventions can also be aimed at helping employees to psychologically detach from work during nonwork time (e.g., postwork evenings), thereby enhancing the quality of leisure experiences (e.g., Hahn, Binnewies, Sonnentag, & Mojza, 2011; ten Brummelhuis & Trougakos, 2014).

### **Limitations and directions for future research**

The study inevitably has some limitations. We relied exclusively on self-report data, potentially raising the influence of common method variance. This issue may have been mitigated in the current study by (a) the use of different measurement time points for each of the constructs under study, and (b) controlling for trait emotional stability and job-related perceptions as part of our statistical modeling (cf. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Nonetheless, it would be useful for future research to assess the degree to which the same personality and cognitive experiences predict more objective measures of sleep maintenance and job functioning across the working week (e.g., Pereira & Elfering, 2014; Vahle-Hinz, Bamberg, Dettmers, Friedrich, & Keller, 2014).

All variables were measured via paper-and-pencil surveys. One disadvantage of this method is that it does not provide an objective indicator that participants have completed surveys at the correct times. There were some practical constraints on the use of electronic survey links for this particular study. We therefore took steps to increase the likelihood that our participants would complete surveys at the requested times (e.g., by asking respondents to record the date and time of completion on each daily survey). Despite the increased use of electronically administered surveys, paper surveys are still deemed most suitable for some organizational contexts and work day variables (e.g., ten Brummelhuis & Trougakos, 2014; Feuerhahn, et al. , 2014; Garrick et al., 2014; Hülshager, Feinholdt, & Nubold, 2015; Onwezen, van Veldhoven, & Biron, 2014; Sanz-Vergel, Rodríguez-Muñoz, & Nielsen, 2015; Volman, Bakker, & Xanthopoulou, 2013). It would be useful for future studies to trial alternative methods of data collection, such as collecting verbal reports of leisure experiences in brief telephone conversations with participants (and perhaps spouses or other family members), and by applying screen modifications to ensure that on-line bedtime surveys do not expose participants to the artificial light that affects sleep quality.

The current study focused on one model (and measure) of perfectionism that was developed by Frost et al. (1990). Although the Frost measure remains one of the most widely used in the perfectionism literature, future studies could also include Hewitt and Flett's (1991) multidimensional perfectionism scale, particularly the self-oriented (SOP) and socially prescribed perfectionism (SPP) subscales. When submitted to factor analyses, SOP items tend to load on to the perfectionistic strivings factor alongside Frost's personal standards subscale, while SPP loads on to the perfectionistic concerns factor alongside Frost's concern over mistakes and doubts about actions subscales (e.g., Cox et al., 2002). Including these additional facets in future studies may help to capture a wider range of employees' perfectionist characteristics.

Although we adopted a daily survey design, we found significant linear change over time for only one of the three model outcomes (i.e., emotional exhaustion, which decreased from Tuesday through to Thursday). We were unable to demonstrate that change in work-related cognitive processing across consecutive evenings was predictive of change in the model outcomes. It is important also to acknowledge that this study's mediation findings are based on between-group (i.e., person-level) effects, with employees' evening and day-level experiences aggregated over consecutive days (see Preacher et al., 2010). Nonetheless, it is worth reiterating that the primary aim of this study was not to examine within-person effects over time, but rather to obtain repeated and proximal measures of cognitive and affective experiences that were predicted to be associated with theoretically distinct perfectionism dimensions. However, given the brief period of data collection, and the fact that we did not extend data collection into Friday afternoon, it would be useful for future research to examine the same set of personality and cognitive processing variables over longer time frames (e.g., two or more consecutive working weeks; see Dunkley et al., 2014).

## **Conclusion**

This study tested a model in which two perfectionism dimensions exhibited a divergent pattern of relationships with employees' work day functioning via distinct modes of work-related cognitive processing. We hope that the findings stimulate further investigations of the adaptive and maladaptive links between employees' personal characteristics and leisure time experiences. Ultimately, we believe such research will be useful for tailoring worksite interventions to those individuals who are experiencing most difficulty recovering from work demands during nonwork time.

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Table 1

*Measurement Schedule*

<b>Day of week</b>	<b>Surveys completed</b>
Monday	Initial, Evening
Tuesday	Morning, After Work, Evening
Wednesday	Morning, After Work, Evening
Thursday	Morning, After Work, Evening
Friday	Morning

Table 2

*Means, Standard Deviations, and Correlations Between Study Measures at the Person-Level and Day-Level*

<b>Person-Level</b>		Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Perfectionistic concerns	2.81	.97												
2.	Perfectionistic strivings	4.33	.81	.22											
3.	Worry and rumination <sup>†</sup>	2.16	.85	.35	.17										
4.	Positive thinking about work <sup>†</sup>	2.14	.62	-.13	.25	.17									
5.	Emotional exhaustion <sup>†</sup>	2.77	1.01	.20	.08	.71	-.04								
6.	Work engagement <sup>†</sup>	3.11	.81	-.25	.13	-.36	.73	-.33							
7.	Sleep quality <sup>†</sup>	3.28	.56	-.13	-.12	-.46	.09	-.28	.28						
8.	Gender	0.28	.45	.01	-.02	.01	.05	.01	-.03	.04					
9.	Age	40.49	9.59	-.07	-.05	.00	.10	-.28	.15	-.10	.13				
10.	Work demands	3.23	.78	.16	.25	.51	.10	.59	-.08	-.24	-.04	-.02			
11.	Job control	3.22	.86	-.23	.16	-.25	.29	-.31	.46	.20	.08	.09	-.19		
12.	Emotional stability	3.88	2.28	-.26	-.15	-.13	.10	-.16	.11	.19	.24	.34	-.08	.11	
13.	Evening hours worked <sup>††</sup>	0.16	.39	-.13	.06	.18	.40	.05	.28	.12	-.11	.18	.12	-.02	-.04
<b>Day-Level</b>		Mean	SD	1.	2.	3.	4.	5.	6.						
1.	Worry and rumination <sup>‡</sup>	0.00	.74												
2.	Positive thinking about work <sup>‡</sup>	0.00	.65	-.07											
3.	Emotional exhaustion <sup>‡</sup>	0.00	.68	-.03	-.02										
4.	Work engagement <sup>‡</sup>	0.00	.61	-.03	.00	-.30									
5.	Sleep quality <sup>‡</sup>	0.00	.71	-.25	.04	-.09	.19								
6.	Time point	2.50	1.25	-.12	-.01	-.19	.03	.01							
7.	Evening hours worked <sup>‡</sup>	0.00	.47	.08	.06	.06	-.01	-.05	-.01						

*Note.* Person-level  $N = 148$ . Day-level  $N = 589$  observations from 148 participants.

<sup>†</sup>Latent manifestation measured by day-level observations; <sup>††</sup> Observed person mean; <sup>‡</sup> Person-mean-centered score.

At the day-level, correlations exceeding .08 were statistically significant at the  $p < .05$  level.

At the person-level, correlations exceeding .16 were statistically significant at the  $p < .05$  level.

Table 3

*Unstandardized Path Estimates and Confidence Intervals for Direct and Indirect Effects*

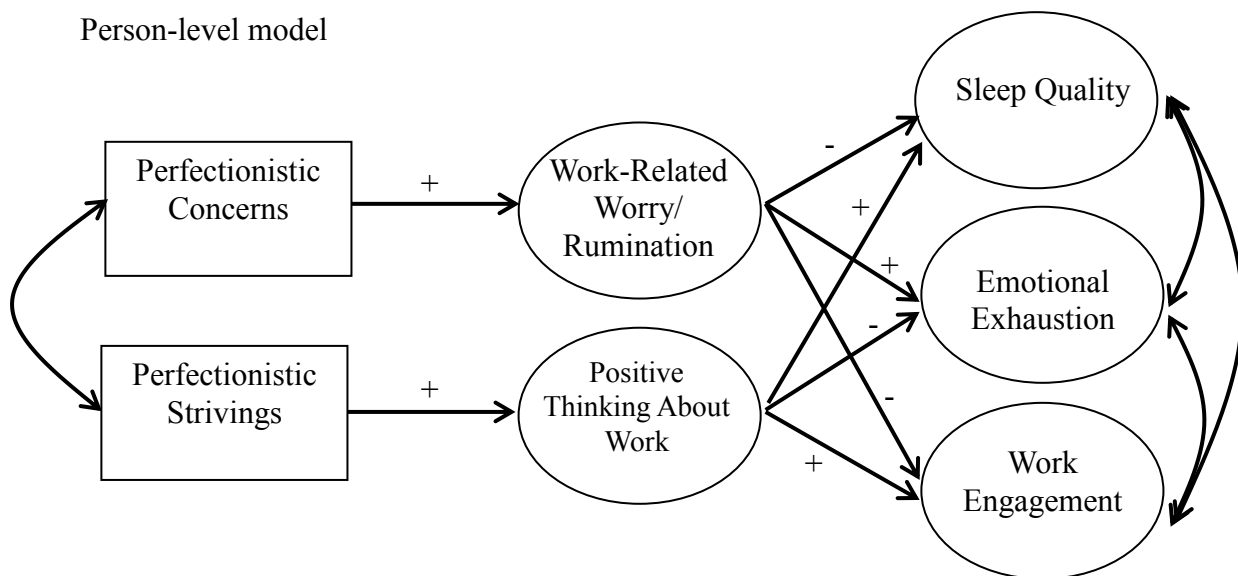
		Work-related worry/rumination†		Positive thinking about work†		Emotional exhaustion		Work engagement		Sleep quality	
Predictor (level, variable)	Effect type	Path Est.	[95% CI]	Path Est.	[95% CI]	Path Est.	[95% CI]	Path Est.	[95% CI]	Path Est.	[95% CI]
Person-Level											
Perfectionistic concerns	Direct	.23*	(.09, .37)	---	---	---	---	---	---	---	---
	Indirect via worry/rum ‡‡	---	---	---	---	.15*	(.05, .25)	-.10*	(-.18, -.04)	-.07*	(-.13, -.02)
Perfectionistic strivings	Direct	---	---	.13*	(.01, .26)	---	---	---	---	---	---
	Indirect via pos. thinking ‡‡	---	---	---	---	-.02	(-.05, .00)	.12*	(.01, .25)	.00	(-.03, .04)
Work-related worry/rumination†	Direct	---	---	---	---	.65*	(.45, .84)	-.45*	(-.60, -.29)	-.29*	(-.44, -.14)
Positive thinking about work†	Direct	---	---	---	---	-.18	(-.45, .09)	.94*	(.70, 1.18)	.03	(-.19, .25)
Gender	Direct	.11	(-.19, .40)	.07	(-.16, .30)	.11	(-.17, .40)	-.11	(-.34, .13)	.06	(-.16, .28)
Age	Direct	.00	(-.01, .02)	.00	(-.01, .01)	-.03*	(-.04, -.02)	.01	(-.01, .02)	-.01	(-.02, .00)
Work demands	Direct	.47*	(.30, .63)	.06	(-.08, .19)	.39*	(.21, .58)	.11	(-.04, .26)	-.01	(-.16, .13)
Job control	Direct	-.11	(-.26, .05)	.19*	(.07, .31)	-.08	(-.25, .08)	.15*	(.02, .29)	.05	(-.07, .18)
Emotional stability	Direct	-.01	(-.07, .06)	.03	(-.02, .08)	.02	(-.04, .07)	-.02	(-.06, .03)	.05	(.00, .10)
Evening hours worked ††	Direct	.37*	(.03, .71)	.64*	(.38, .90)	.03	(-.35, .40)	.10	(-.21, .41)	.35*	(.06, .64)
Day-Level											
Work-related worry/rumination‡	Direct	---	---	---	---	-.05	(-.15, .05)	-.02	(-.11, .07)	-.24*	(-.33, -.15)
Positive thinking about work‡	Direct	---	---	---	---	-.03	(-.14, .09)	.00	(-.10, .11)	.03	(-.08, .13)
Time point	Direct	-.08*	(-.13, -.02)	-.01	(-.05, .04)	-.12*	(-.20, -.04)	.01	(-.06, .09)	-.01	(-.06, .04)
Evening hours worked‡	Direct	.13*	(.01, .25)	.09*	(.03, .19)	.09	(-.05, .23)	-.01	(-.13, .12)	-.04	(-.16, .09)

Note.  $N = 589$  observations from 148 participants.

<sup>†</sup>Latent manifestation measured by day-level observations; <sup>††</sup> Observed person mean; <sup>‡</sup> Person-mean-centered score.  $*p < .05$ .

<sup>‡‡</sup> For indirect effects, 95% confidence intervals were calculated by Monte-Carlo simulations as recommended by Selig and Preacher (2008); Preacher and Selig (2012).

Person-level model



Day-level model

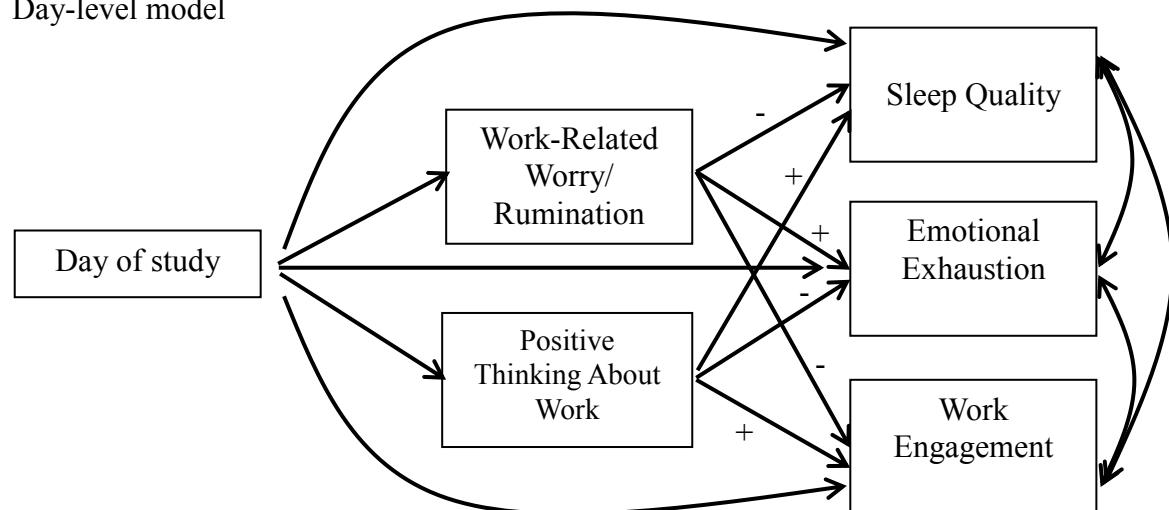


Figure 1. Hypothesized MSEM to test person-level relationships between two perfectionism dimensions and sleep quality, emotional exhaustion, and work engagement, via distinct modes of work-related cognitive processing.